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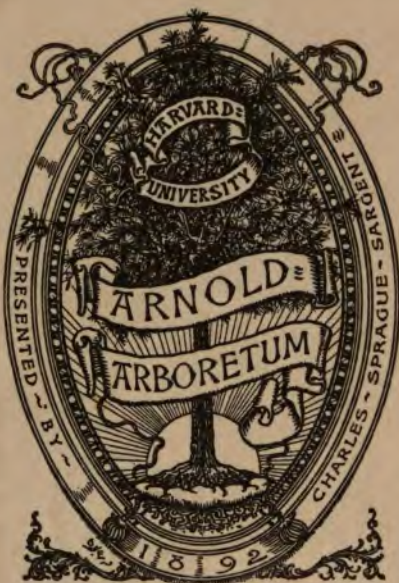
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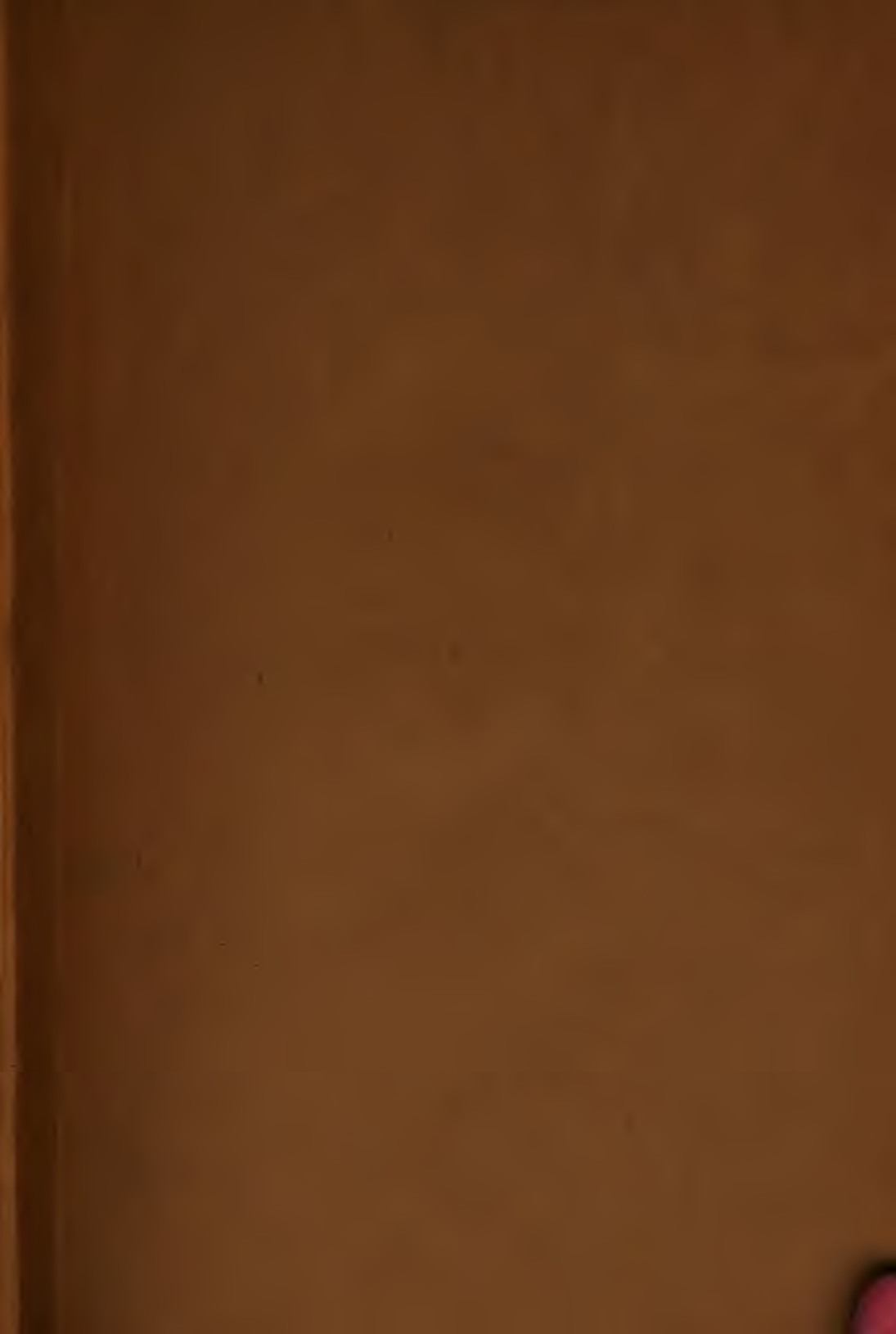
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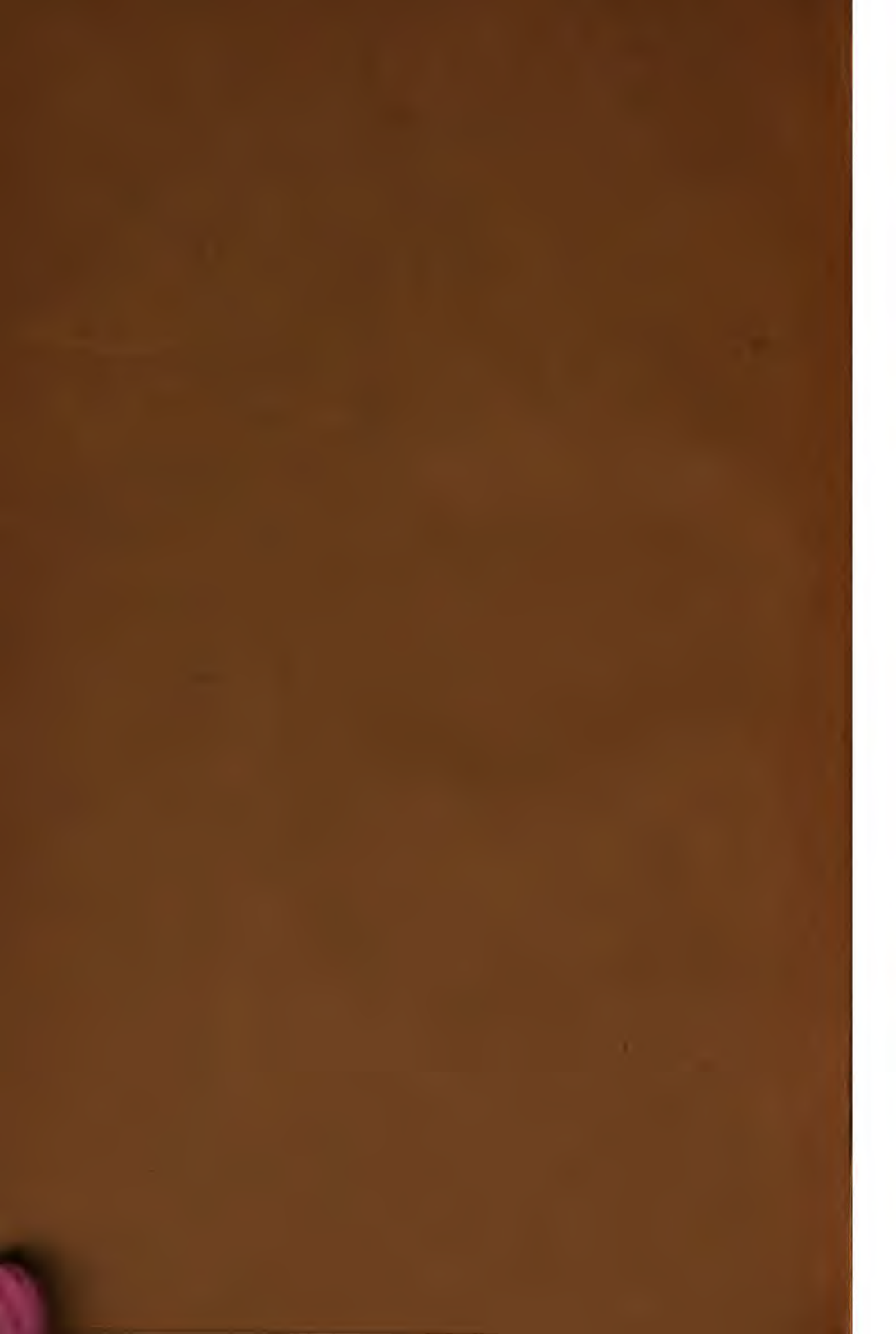
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FORESTRY MANUAL

OF THE

IOWA STATE HORTICULTURAL SOCIETY.

"Timber-growing is no longer an experiment, but, with care, a certain and complete success.
"If planted in belts around the farm, the protection is worth more than the rent of the land on which the timber stands. All the timber which I have planted, or will plant under the present law, will stand, when ten years old, without having cost me a cent.

"It renders a farm so much more comfortable, beautiful, and attractive as a home, and so much more valuable if we ever wish to sell.

"One can hardly look on these beautiful groves, with their cool shade in summer, and protection in winter, without a feeling of self-conscious satisfaction that he has done one good thing for himself, for his State, and for his posterity."

Hon. O. E. WHITING.

For Gratuitous Distribution to Iowa Tree Planters.

REVISED FROM THE FORESTRY ANNUAL BY H. W. LATHROP.

DES MOINES:

F. M. MILLS, STATE PRINTER.

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INSTRUCTIONS

FOR

PROCURING AND PLANTING SEEDS, CUTTINGS, PLANTS AND TREES, INCLUDING SMALL FRUITS, PLANTS AND VINES, AND ORCHARD TREES.

THIS Manual is issued by the State Horticultural Society for the benefit of those having but little experience as to the best methods of propagating, handling and setting trees.

STRAWBERRIES.

The preparation of the ground for strawberries should be made by deep plowing and thorough pulverizing, and it should be sufficiently rich to produce a heavy crop of corn. The plants may be put out in September, or early spring, and if for field culture, in rows four feet apart, with plants one foot apart in the row; if for garden and home culture, the rows two feet apart. If put out in the fall they should be mulched with coarse litter to prevent winter-killing. In large plantations they may be tilled with a straddle-row cultivator, the same as corn, and they should have a plowing every week or ten days during the first part of the season, and the plants may be allowed to spread until they occupy the space of one foot in the row. They should be mulched at the beginning of the winter with some material that is free from seeds, such as corn or sorghum stalks, prairie hay or coarse straw. The mulch, after the frost is out of the ground, is to be raked between the rows to retain the moisture in the ground, and afford a clean path on which to do the picking, and to enrich the ground by its decay.

When the plantation is to be renewed, which should be done every fourth year, plow the ground between the rows, set out the plants therein and then plow up and cultivate the old row.

For varieties, select from the list recommended by the State Horticultural Society. Strawberries thrive best in moist soils, if well drained, and they flourish better in a wet than in a dry season.

RASPBERRIES.

The preparation of ground should be the same as for strawberries, the rows to be from five to seven feet apart, depending on the length the canes

are permitted to grow. The ground should be richer than for strawberries. The plants may be put out in the fall or spring, but if in the fall, a small mound of earth should be raised over them before the ground freezes. Set them from one to three feet apart in the row and cultivate as you do corn. When the young plants have made a growth of from one and a half to two feet, pinch or cut off the terminal bud; it will then throw out branches, and when the branches have made a growth of one foot or more, cut off their terminal buds. After the crop of berries is harvested, the old bearing canes should be removed, and only from three to five new canes should be permitted to grow from one stool. If you plant the suckering varieties, unless the suckers are wanted for transplanting, treat them as you would weeds, and subdue them on all suitable occasions with the plow or hoe.

BLACKBERRIES.

The planting and cultivation of this fruit should be similar to that of the raspberry. It will flourish with partial shade better than any other fruit, and may be planted on the north side of a grove, or in a young grove not too thickly shaded. In the blackberry days of early times it succeeded best on our sparsely-timbered lands and in our hazel thickets.

CURRENTS

Should be planted in rows five feet apart, and three to five feet in the row, depending upon the number of canes left in the hill. Prepare the ground as for raspberries, and plant cuttings or rooted plants. If cuttings, they should be made from the last year's growth, soon after the leaves have fallen, and if then put in the ground and well protected during the winter, will become callused and frequently-rooted, so that they may be put out in the spring following. The currant is a gross feeder, and will use to good advantage an abundant supply of manure. A heavy mulching should be applied each year and left on the ground to decay and fertilize it. From five to eight canes only should be left in a hill, and all superfluous sprouts should be removed. Occasional pruning of canes may be made when they branch too much, and as the plantation attains age the old canes that become enfeebled should be removed and their places supplied by young sprouts.

GOOSEBERRIES

Should be planted, and cultivated, and cared for like currants.

CHERRIES AND PLUMS.

Trees of these fruits should be planted much like apple trees, and have about the same care, but being of smaller growth they can be planted nearer together. In our climate it is useless to try any but our native plums, or those closely allied to them, and of cherries only the Richmonds and Morellos have succeeded.

GRAPES.

Should be planted quite deeply—18 inches or more—and then be well protected the first winter by being laid down and covered with earth, and if of tender varieties they should be protected every winter. The first year but one cane should be grown, the next not more than two, and the third a little fruit may be obtained. Plant in rows six to eight feet apart and train to trellis or stakes, vines four to eight feet in the row. A trellis may be made of three wires, the highest not more than four to five feet high, or stakes may be used from two to four inches in diameter. With the trellis you can cultivate or plow but one way, while with the stakes plowing may be done both ways. The pruning should be done in the fall, winter or spring, before the buds begin to swell. No definite rule can be given for pruning, but in doing it we should bear in mind that only the last year's growth produces fruit. A young or feeble vine should not have too much bearing-wood left on lest it overbear, while a strong and well-established vine may be more heavily taxed. Cultivation of the vines with the plow, cultivator, one-horse harrow or hoe should be begun as soon as the ground is in good condition to work in the spring, and it should be kept up until well into midsummer or later. Close pruning induces the growth of large berries and large bunches, while a superabundance of fruit-bearing wood tends to the production of numerous small bunches, with smaller berries. Each bud on last year's growth of wood may be counted on to produce from one to five bunches of grapes when the vine is well pruned.

ORCHARD PLANTING AND CARE.

For orchard planting preparation of the ground should be begun in October by giving the soil a deep plowing, or what is still better, a good trench-plowing or subsoiling, and the plowing should be done so that each row of trees can be planted in a dead-furrow. Fall is preferable to spring plowing, for the reason that the soil is then in better condition to be worked, and where the plowing is deep the frosts of winter and the rains of spring render the ground more friable, especially if the soil or subsoil be stiff clay. The distance of the trees apart should not be less than twenty-five feet and, where land is plenty, thirty feet is better. By a quincunx arrangement of the rows a greater number of trees can be planted to the acre and still be the same distance apart than where each tree stands directly opposite its fellow tree in the adjoining rows.

In selecting trees get them from a good, reliable nurseryman, and procure them in the fall, soon after defoliation, and keep them over the winter well buried in the ground, and by well buried I mean covered root and branch with the earth in close contact with all the roots. If trees have to be transported far from nursery to orchard the roots should be well protected from the drying effects of both sun and winds.

As soon in spring as the ground is in condition to be worked the planting should be done. In the first place the rows should be measured off the re-

quired distance and a stake be set where each tree is to be planted, and, unless the surface of the ground is so uneven as to prevent, the stakes should be made to form straight rows east and west, north and south, northeast and southwest, and northwest and southeast. If the rows running north and south and east and west are eighteen feet apart and the trees are set on the quincunx plan they (the trees) will be a little over twenty-five feet apart, and if the rows are twenty-two the trees will be about thirty feet apart. The holes should be dug of sufficient width to receive all the roots in their natural position, and if a foot wider all the better, and the bottoms of them should be well spaded up to the depth of ten or twelve inches. Particular care must be taken to have the soil in close contact with all the roots, and it should be tramped with the feet unless a bucket full or so of water be applied as the process of filling the hole proceeds. Care must be taken that all the roots are in their natural position. Set the trees so that they will incline about ten or fifteen degrees to the southwest, as the tendency of most orchard trees is in the opposite direction when set perpendicular.

The trees should not be more than three years old, and perhaps two-year-olds are better, as they can be removed from the nursery with less loss of roots. Before being planted each tree should be encircled with a piece of common building tar-paper, extending from the surface roots to the limbs. This will protect them from the depredations of borers and rabbits, and prevent sun-scald during warm winter days. It should be large enough to encircle the tree after it shall have made several years growth. The depth of planting should not be much greater in the orchard than the nursery, but very soon after the planting is completed culture should be begun by plowing the ground to the trees, which will give them the depth they need. Soon after this plowing is done a good mulch of hay, straw or coarse manure should be spread around each tree, extending far enough to well cover the roots, and sufficient earth be thrown upon it to prevent the wind from blowing it away. If this mulch cannot be obtained the soil about the trees can be kept moist by frequent stirring, and the more frequent the better. That crop and that culture is the best for a young orchard which calls for the most frequent working of the surface soil during the early part of the season, and hence potatoes, corn, beans, mangels and kindred crops should occupy the ground for the first four or five years. Fodder-corn and buckwheat are both good orchard crops after the trees have become large enough not to be shaded by them. I have sometimes practiced sowing my orchard with peas—broadcast—but in a dry season they are not a very certain crop.

At the first two plowings the earth should be turned toward the trees, and after that alternately to and from them until the orchard is to be seeded to clover or timothy, when the last two plowings should be toward them. From three to four years at a time is sufficiently long for an orchard to remain in grass, when it should be replowed and cultivated a year or two and then put in grass again. If hogs with noses "*full-jeweled*" can be permitted the run of the orchard after the trees have become sufficiently large not to be injured by being rubbed against by them, it may be of equal benefit to a

good cultivation, but the grass *must not be fed off too close by them*, lest they strip off the bark from the trees. After an orchard has been planted and the trees have become well established the height at which they are to form their heads should be determined, and, except in cases of upright growers, like Benoni and Red June, the distance should not be less than four feet from the ground. Where trees have been headed lower than this in the nursery a pruning of the lower branches will have to be resorted to to produce the desired result. While some trees have a tendency to form too close a top, others have a different habit, and the tendency of one can be checked by thinning out and the habit of the others corrected by cutting back the branches. Under the scorching suns and the blasting winds of our arid climate a close top is preferable to an open one, and the pruning-knife should be used with care, skill and judgment. The time to prune is at all times except the cold weather of winter, for a branch that needs to be removed should never be permitted to grow so large that it cannot be readily cut off with an ordinary pocket-knife. If, however, pruning has been neglected till the saw must be called into requisition I know of no better time for its use than late fall or early winter. Wounds then made rarely ever bleed, and the part from which the circulation of sap is cut off becomes so well dried and seasoned when the spring flow of sap commences that but little, if any, decay takes place before the wound is healed over. Let the pruning be done so that all cross-growing and in-growing branches be removed, and so that the lowest branches shall be the largest and longest ones. If any nests of the tent caterpillar have escaped destruction the trees should be visited soon after the buds burst in the spring, when the young insects will be found pitching their tents in the forks of the limbs, where they can easily be destroyed by the hand or be brushed off with a bunch of rags tied to the end of a pole. Early in June the bodies and large limbs of the trees should have a good washing in strong soap-suds or weak lye from wood ashes. This washing will keep the bark smooth and healthy, and prevent the formation of hiding places for insects. If borers have ever found a lodgment in any of the trees they should be made the subject of watchful extermination. The knife and wire probe are the best weapons of offense against these troublesome pests. A never-failing sign of their presence is their saw-dust-like deposits about the roots. An application of boiling lye from the spout of a tea-kettle to the outside of their places of retreat is said to be effectual in destroying them in the early stages of their existence. The advent of bark-lice, canker-worms, cicadae, codling moths, fall web-worms and all other insect enemies should be met with a fixed resolution for their immediate extermination if possible, for while the price of berries may be a few cents per quart, and of grapes two or three cents per pound, the price of apples is "eternal vigilance."

On the great prairies, the first trees planted should be the fast growing ones.

The new settler on the prairie is in absolute need of some wind-break that will modify the force of our summer storms, and our winter blizzards;

and his early need of poles taken from the tree plantation for various farm uses, including fuel, should induce him to plant such varieties as will make the most wood-growth in the shortest time. Of these are the poplars, cottonwood, Balm of Gilead and White willow.

COTTONWOOD.

The Yellow and White varieties of this tree are identical, the *apparent* varieties growing out of the different conditions of growth, the Yellow predominating in thickly planted groves, where the growth is slow and the trees are shaded, and the White predominating where trees are grown sparsely.

In starting a grove, secure young plants from the rivers and creek bottoms where they are obtainable. If these cannot be got, take cuttings from thrifty young trees; the cuttings should be from young wood, as the roots from this strike more readily.

In making plantations, if cuttings two or three feet in length, and from one to two inches in diameter be used, they will grow with more uniformity and give less trouble in cultivation than small cuttings, or even small plants. These cuttings should be sawed off into lengths wanted, and the lower end sharpened with a keen ax, with a sloping cut *all on one side*. Set these cuttings by making holes with a light iron bar, in which the cuttings are driven carefully with a wooden mallet; all of the poplar and willow family of trees grow best from cuttings put out in the fall, if they are set firmly and deeply. Either in fall or early spring, set them where wanted as soon as a wagon load of cuttings is prepared. They are much injured by lying around, even for a day or two. If more convenient, the cottonwood may be grown by the million from the seed, with very little trouble. Gather the catkins in June, rub them apart with the hand when ready to sow, and mix them up with sand to facilitate even sowing. Put in drills on mellow, moist soil, and cover not more than one inch deep: all of the willows and poplars may be started in great quantity in this way where the catkins are abundant.

Do not put cottonwood trees too near the orchard or small fruit plantation, as they make severe drafts on the soil, both for moisture and plant-food.

LARGE ASPEN.

This is a tall, erect tree, covered with a smooth bark of a soft, light greenish-grey color. It is a native tree in the northern part of the State, but not very abundant. Where its value is known, it is used for hewing sticks, for which purpose it is well adapted, where it can be kept dry. But used for sills, it has proven fully as durable as pine. It is stiffer than pine, and not as liable to settle under weight. It grows very straight, and retains its size, making it suitable for long sticks—many houses on the Cedar River were finished with this lumber in an early day. It is not liable to warp, and is susceptible of a smooth finish—if dry when used it shrinks less than pine.

A fence made of rails split from this tree in summer and peeled, twenty-two years ago, has had but few rails supplied, though nearly all of the original Bur oak posts have been replaced.

As fuel, it is about equal to pine. Mixed in groves, it gives an agreeable expression, resulting from the soft green of the trunk, the lightness of the branches, and the ever moving character of the foliage.

As with all the family, this tree grows readily from cuttings, and its catkins grow as readily as the cottonwood.

WHITE WILLOW.

This tree is being extensively planted as a combined stock-barrier and wind-break—but few trees have been planted as yet in timber belts—in fact the general impression, even of the friends of the willow, is that it has little value either for fuel or any other use connected with farm improvement, aside from that for which it has been so extensively planted. In Europe, however, the White willow is regarded as a valuable timber tree, and the time will come when it will be so regarded in the prairie States. We have become so wedded to the use of pine lumber for building purposes that the idea of using the poplars and the willow in its place, grown on our own ground, and cut up with cheap portable mills in our own yards, we are slow in acquiring—but with the coming scarcity, and advance in price of pine lumber, *we will become more teachable.*

It grows rapidly, often to the height of thirty feet in ten years, and attaining a height of over eighty feet.

Large cuttings planted in spring or fall, as with poplars, furnish the easiest method of starting the grove, or the combined wind-break and stock-barrier.

Perhaps no tree raised in the northwest will produce as many cords of wood to the acre in a given time as this, and the readiness, vigor and rapidity of growth with which it reproduces itself from the stump when the top has been cut off, as well as the adaptability of the timber to various farm uses, recommend it for extensive planting. No one of our trees will, like it, make a live fence and a fence from which we can take stakes, poles and fire-wood, without weakening the fence as a stock-barrier.

WHITE POPLAR.

This beautiful tree is usually voted a nuisance as an ornamental or shade tree, on account of its wonderful tendency for suckering.

In groves, this habit would prove no drawback to its culture—it is probable that we have no tree that will reach saw-log size as soon as this. Trees in this State are plenty, two feet in diameter, with a growth of only fifteen years. Isolated trees head low and have wide, spreading tops. In groves, it runs up tall and straight, and the poles taken out in thinning reach a size suitable for nailing on fence posts, and even for rafters and sleepers in

astonishingly short time. If cut in summer and peeled, they prove durable for these purposes, where kept from the ground, and they are very strong.

It may be propagated by slips, suckers, or by branches five or six feet long and two or three inches in diameter; where the latter are used, the larger end should be sharpened by a sloping cut on one side, to expose the bark, and set fifteen or eighteen inches in the ground. The disposition of the tree to sucker would be no objection in forest culture.

We urgently recommend this tree for extended planting in outside belts, on our most exposed prairies. It will prove immensely valuable in the near future for building purposes.

VALUABLE SPECIES LESS RAPID IN GROWTH.

No attempt will be made to place the different species found valuable for prairie planting in the order of their relative merit. It is not expected that every planter will include all, or even a large portion of the species recommended. In no case defer planting trees, if you have the ground ready, and can secure the plants of any given species. Put out plants or cuttings, or better yet *seeds* of the most desirable trees obtainable in your immediate vicinity, rather than defer planting for a single year.

WHITE PINE AND LARCH.

These well known trees are placed together, as many experiments at the West have demonstrated that they are mutual aids to each other in growth, and on the prairies we have special uses for the larch poles, when it becomes necessary to cut them to give room for the development and growth of the pines. But few of our prairie settlers realize how cheaply they can now start an acre or two of these valuable and really quick-growing conifers. Aside from intrinsic value for timber, such groves prove good investments in the way of breaking up the monotony of prairie scenery, and as places for pleasant resort for stock in winter as well as in summer.

The most profitable mode of planting is to set the plants in rows four feet apart. Every alternate row is planted exclusively with larch, three feet apart in rows. In the row in which the pines are planted, they stand eight feet apart, with a larch planted half way between. When the larch poles are cut, the pines stand eight feet apart both ways.

A practical estimate of cost of two acres, and results at the end of ten years, may prove useful.

PRACTICAL ESTIMATE.

Forty-two hundred larch plants (transplanted 12 to 15 inches).....	\$ 42.00
Fourteen hundred White pine (transplanted 12 to 18 inches).....	28.00
Preparing ground and setting.....	15.00
Culture for four years.....	25.00
	\$110.00

After the fourth year these trees will keep down nearly all weed growth and the ground will begin to be carpeted with a mulching of leaves. As wanted for use, when from eight to twelve years planted, the larch trees would be worth not less than fifteen cents per tree for wire fence posts, poles for fencing and other uses, for fuel, etc. The account would then stand:

Credit to larch, forty-two hundred trees at 15 cents each.....	\$ 630.00
Outlay in cash and labor.....	110.00
Estimated profit.....	\$ 520.00

Is this an unfair statement or one not sustained by actual prairie experience?

The rent of land is not included, nor interest on investment, but as an offset to this and other possible contingencies, we have the two acres covered with a rank growth of pines, fifteen to twenty feet in height. If we consider these as an investment for our children, and as important additions to the beauty and real selling value of the place, we can well afford the outlay. As to health and rapidity of growth of the pine there is no doubt. H. C. Raymond, of Council Bluffs, is fitting up a site for the new house of his older days, which he expects to build with lumber now growing in his beautiful pine grove, now twelve years planted, and it is well worth a visit to Council Bluffs to see this grove. His Scotch pines are doing well.

As to the estimated value of the larch poles, we have plenty of experience in all the older counties of the Western States proving the above estimate *too low*, if the poles and posts prove durable. Where set in the ground green they do not prove very durable; when thoroughly dry, we don't yet know how long they will last, as no case of rotting of prairie grown posts thus prepared will probably be reported yet for many years. As to the kind of larch, the European has given best satisfaction in growth, but do not hesitate to plant the American variety if good plants can be obtained cheaply. Those from Wisconsin have grown as fast as the European, and the poles are just as durable. Prepare the ground for planting in the fall and put out the larch plants *just as early in spring* as the ground can be worked. They start very early and at a very low temperature, and are very apt to die or be seriously set back, if started before setting.

In handling the young pines, if the tops are clipped quite severely they will be more certain to do well. Do not expose the roots *for a single minute* to air or sun. If other conifers be mixed in the plantation, it will add to the beauty of the ground.

The relative value of the conifers for shelter-belts and ornamental purposes, is considered in the annual reports of the Horticultural Society, a copy of which should be in the hands of every prairie farmer.

THE ASH.

We do not hesitate to say avoid Eastern grown seeds. On the nearest river or creek bottom gather seeds without thought as to species, except in the case of Black ash, which is distinctive and well known.

Spread out the winged seeds on a smooth, hard patch of dry ground, not more than four inches thick, cover with straw, with boards on top to keep off most of the snow and rain; sow early in spring, if possible where permanently wanted. Mark out the ground one way, as for corn, in rows four feet apart, plant four or five seeds a hill, every two feet in the rows. A few days later plant small sweet-corn, or Yankee-corn, in the spaces between the points where the ash seeds are germinating. Start the cultivator as soon as the plants can be seen. While the plants are making a start, go through with a hoe to keep down the weeds. In a very few days the two-horse cultivator may be run as close to the ash plants as to the corn. Leave the cornstalks on the ground to hold the snow the succeeding winter. The surplus plants may be used to fill vacancies. If you call the plantation thus started White, Red or Green ash, you will soon find, with good care, that you have a young grove of which you are proud.

BLACK ASH.

Nature plants this useful tree as she does the larch, in swamps, along ravines, in moist rich bottoms, and quite rarely on rich second bottom lands. It does not prove profitable to plant it on dry ridges, nor, indeed is it best to put it in full rows, in plantations running from the edge of ravines to higher land. Plant low moist patches, wherever they occur, with Black ash. On such grounds, with culture when young, this ash grows rapidly and thriftily. Plant very closely in the rows and utilize the poles in thinning for hoops, splints, stakes, etc. With increased size the poles are strong and durable nailed on posts for fences. This ash, like all the others, is noted for vigorous sprouting from stumps cut in winter.

W. L. Brockman, of Carroll, Iowa, recently pulled a Black ash sprout, of one season's growth, ten feet in length.

Propagate same as White ash.

BLACK CHERRY.

Contrary to usual belief, this tree grows very rapidly on our richest prairie soil. In the early plantations of timber trees, near Elgin, Illinois, a tree of this kind has a circumference of sixty inches one foot above the crown. It grew from seed planted twenty-six years ago. Trees in groves in eastern Iowa, fifteen years planted, are fully as large as Soft maple of the same age, though for the first eight years Soft maple attains the greatest diameter, but the least height. In response to request, Dr. Warder, of Ohio, sends a paper on the desirable points of this tree for culture, to which attention is directed in the Iowa Horticultural Report of 1878.

Several correspondents have admitted the value of the timber for fuel, and its probable value in the near future for manufacturing and cabinet uses; but complain that it does not come up to recommendation in durability for posts and stakes. As with the elm, larch and Black walnut, if the posts are set green, this complaint is well founded; but if the bark is hewn off from the lower ends, and from two sides above, and the posts are *set* up for seasoning one year, they become durable as post timber. The complaint is also made that the caterpillars breed on these trees, making them always plenty in the adjoining orchards. The outer trees in groves *are* troubled in this way, but rarely is a nest found, *only* on isolated and border trees. Our fruit trees near to dozens of isolated Black cherry, have been less troubled with the caterpillars than orchards a mile distant from such trees, for the reason that they prefer the cherry to the apple trees.

The Black cherry produces an abundance of fruit, while the trees are yet small. Under culture, the size and quality of this fruit is much improved.

Cherries for seed may be gathered by being shaken on to sheets or blankets; to preserve them through winter, mix thoroughly with sand, place in shallow boxes and bury slightly on north of a fence or building, or place the boxes in the cellar. In the spring they germinate at a low temperature, and must be planted early. They make trees far more rapidly if planted where wanted, as advised for the ash; they transplant well, but, as with most of our fruit trees, much is lost in health and rapidity of growth by disturbing the first tap-root. If planted in hills, put three or four pits in a place and save the best plants the next spring.

BLACK WALNUT.

Each season we acquire new bits of experience, as guides in the labor of tree-planting.

Careful observations during the past two years in the prairie States, convince us that the Black walnut makes most rapid and healthy growth on our prairies richest in humus, and yet having a porous subsoil, so that it will not suffer in extreme seasons of wet or drouth.

Another fact in relation to its growth has become apparent, which will be important for planters to remember: where blue-grass has been introduced, it is sure to get in and ruin or sadly injure the trees when planted alone in groves, unless culture be kept up more years than it is profitable. This special liking of the blue-grass for the Black walnut groves results from the very late period in the spring when the foliage is fully expanded, giving the blue-grass such a start that it matures its seed. In Illinois this has become such a drawback in the culture of this tree, that its now being planted in alternate rows with some tree coming into leaf early in the season. Soft maple and box-elder have been used to good advantage for the alternate rows, which must be taken out in whole or in part for fuel, when it is evident that they are seriously injuring the walnuts. With this treatment, the walnuts will run up faster and straighter than when planted alone, and they will be free from grass.

Judge Whiting gives this opinion as to value of timber for posts, and mode of keeping and planting nuts:

It is very durable, if put in the ground dry, for posts. Fifteen years ago I planted cedar and walnut posts at the same time, and also posts of White oak. All are now decayed about equally. Always plant the walnut where you want it; will transplant well, but loses, in losing its tap-roots, years of growth. Seven bushels of walnuts, with the shucks on, will plant an acre. During the winter I put in trenches, not too thick, and cover with leaves.

Plant before sprouting, if possible. Mark the ground as for ash, and plant the nuts early and deep, so that they will not dry.

BUTTERNUT.

This well known tree of the Northern States does well on about all our varied prairie soils, either in groves or planted singly, if in not too exposed positions. Western experience makes it certain that propagated from seed, with culture when young, the nuts may be much improved; as the shell becomes thinner, the kernel becomes larger and richer and it is much easier taken from the divisions of the shell. It is well worth planting around our prairie homes for its fruit. Fuller says: "Farmers, remember that a few butternut trees may cause your sons and daughters to send a thought or blessing back to the old homestead, when far away and surrounded by the cares and anxieties which we all experience in our journey through life."

When dry, the wood lasts well for posts, and the poles, when large enough to split, where they run up straight in the close plantings, are durable and strong for fence rails. The nuts are prepared for planting and they are started the same as Black walnut.

HONEY LOCUST.

This fine native tree has received more attention in Europe than here. It has there sported in distinct varieties, with extremely varied habits of growth. This tendency to variation is exhibited in growing its seedlings, and we even notice that our native trees are varied in time of flowering, color of petals, habit of growth, and even in hardiness of tree when grown on the prairie. Our correspondence continually indicates a common belief that this is a true locust, and that like the Black locust, it is noted for sprouting and liable to the attack of the borer. We wish to repeat that it *does not sprout* any more than the maple, and that no form of insect has yet molested it, except a long-necked beetle often found on potato vines, called by Harris, *Cantharis Cinerea*. Plants in nursery and young hedges are sometimes set back by these hungry fellows at work on the foliage. The only effect, aside from a brief check in growth observed, is that the plants so treated become more thorny than those unmolested. We have experience with this timber as a fence material dating back near twenty-five years. Fence rails of that age, made from tough native timber, nailed on posts, have outlasted three sets of posts and two sets of Red oak rails, and the locust rails are yet

mostly good. These rails were split and nailed on in June and July. Posts made from native timber, seasoned one summer before setting, mixed with White oak posts treated in the same way, lasted equally well. Some *long* Honey locust posts in this fence, when rotted off, were inverted, and lasted ten years longer in a new fence. It is well to say that young timber rapidly grown on our rich prairie soil, will in no case prove as durable as that of our old native trees. But recent observation in the groves of Illinois of twenty-five years' growth, makes the fact evident that as growth is impeded by standing *thickly* and complete occupancy of the soil by roots, the proportion of sap-wood becomes small, and the heart-wood becomes firm and dry, as noted in thick growths of the poplars. As fuel, the Honey locust rates in value with the Red oak.

The seed ripens in autumn, and may be gathered any time during the fall or winter; but the sooner pods are gathered after falling to the ground, the better. On most of the rivers of the State pods may be gathered in quantity grown on thornless trees.

Before planting, scald the seeds severely; part of them will swell; sift these out with a coarse fanning-mill sieve; scald the remainder again, repeatedly scalding and sifting until all are swelled. The ground should be ready and the seeds at once planted. They will come up in two or three days if the weather be favorable, and their upright growth is so rapid that less care is needed in picking out weeds from among the plants than with any other forest-tree seedlings. Keep the weeds down carefully with good culture during the summer; take up the plants in the fall and heel in carefully where water will not stand, or cover in seed-bed with a heavy mulch as soon as the ground commences to freeze. If left standing in seed-beds, the plants are often injured during the winter unless mulched. After the first year the plants are perfectly hardy, if seed from our native trees be used. Many of the plants produced from the foreign Honey locust seed prove as tender in our climate as the peach tree. No valuable tree in our list bears transplanting with as little check to growth as the Honey locust. For directions as to best mode of transplanting, see future page.

RED ELM.

If this elm be planted singly for lawn or shade trees on the prairie, its terminal branches are often covered with unsightly excrescences; but thrifty seedlings, in forestry rows, four feet apart, cultivated for four or five years, will grow right along and show every sign of health and vigor. It is best, though, to plant outside rows to windward, with trees better adapted to the winter blizzards. Few realize the rapidity of growth, under culture, of this valuable tree. The writer has trees of six years' growth as large as box-elders of the same age; that is, not quite so large at the crown, but containing more timber on account of retaining size to much greater height. We have no tree with so great a proportion of heart-wood in young growths as this elm can show. In close plantations it runs up straight and tall,

and when the poles are large enough for two rails they divide like the chestnut, and the rails, nailed on posts, are very strong and durable. At any stage of growth the poles are durable set in the ground, if thoroughly dried before they are set. A very dry elm pole, set for a hop-pole twelve years ago, is still standing.

This special commendation of the Red elm may be received with some doubt by those who have given the matter little attention. The idea is not intended to be conveyed that exclusive plantations be made of any one tree. But example and habit have too much influence in guiding tree-planting. The Soft maple, for instance, has become, over our State, the popular tree for general planting. Let us suppose the Red elm has become equally popular. It grows as rapidly, it is far hardier, it is freer from insect ravages, it is worth far more for fuel, it is excellent for rails and even posts, its lumber is valuable for stable floors, bridge plank, wagon hubs, and many other uses, the trees require little, if any, care in the way of pruning, etc., etc. If it could supplant the maple, the gain would soon be very apparent.

The seeds of the elm ripen in May, usually before the trees come into full leaf. The seeds are light, and being surrounded by a membranous wing, they are widely scattered by the wind. Sow at once on gathering, and by all means sow where wanted if possible. They may be planted in corn hills to excellent advantage. They usually grow about one foot in height the first season. Planting with corn is an advantage, as the plants are sometimes injured when very young by direct exposure to our dry air and hot sun of July and August. The plants transplant readily, but if you want rapid growth, never break the first tap-root.

SOFT MAPLE.

This and the Red maple are well-known trees all over the prairie States where trees have been planted. It is unfortunate for our farming interests that it is so well known; a cord of its wood from young groves is worth but a trifle more than a cord of cottonwood, and it has literally no recognized value for any other use in the farm management. The older plantations demonstrate that it begins to decline in groves when about fifteen years of age, just when most of our trees of a better grade begin to make more rapid growth, and it is very liable to be broken off by our strong winds.

Yet we say, plant the Soft maple if it be found inconvenient to start more valuable species. When the crab-apple is in blossom is a good time to go for the seeds; plant at once in moist ground. If gathered where floating on water, all the better.

ASH-LEAVED MAPLE.

This is a tree of the far Northwest, and planted in isolated positions on our bleakest prairies it yet maintains health and vigor. Its timber for fuel is far more valuable than Soft maple. For other farm uses its wood has little value, unless, as in Europe, it becomes useful in cabinet work. For isolated shade-trees on the prairies it has no superior, either as to perfection in health

or symmetry and beauty of form. Trees suitable for this use can only be grown in thickly-planted belts, where the stems are *forced up straight*. When transplanted where they have room they soon form neatly-rounded tops.

LIVE FENCE-POSTS.

The straight trees from thick groves of box-elder have a peculiar value for planting on outside or inside fence-lines for posts on which to fasten barbed wires. They will outlast several sets of posts and their beautifully rounded forms of top are objects of beauty in summer and assist in breaking up wind-sweep in winter. Suel Foster suggests a method of fastening the fence pickets, to which the wires are attached in the usual way, to the trees. His method is to wind, spirally, a piece of fence-wire around a stake driven firmly into the ground, *so as to form a coil spring*; with these pieces of coiled wire, of suitable length, the picket is attached at top and bottom to wires which hold the fastenings from slipping down the tree. The tree will be somewhat scarred by the wire in time, but the damage is trifling with this truly iron-clad tree. The trees for this use should be set about ten feet apart, and the pickets and wires should not be attached until one or two years after the trees are set.

Gather the seeds in the fall and keep under cover of boxes or boards until time for sowing, as recommended for ash seeds. Strong cuttings, put out in the fall, deeply, as recommended for the poplars, will usually make a fine growth the ensuing season.

BLACK LOCUST.

We earnestly advise the planting of the locust on our newly started prairie farms. But we do not advise planting it alone. Plant alternate rows of box-elder for fuel. These will force the locust trees up tall and straight, suitable for fencing uses. We need not be afraid that the locust will be smothered if the rows are four feet apart. Planted in this way, if the borer makes another raid, the trees will not be apt to be seriously injured. The dense foliage of the box-elders early in the season seems not to furnish favorable conditions for the deposit of eggs by the moths; either this, or the conditions are not favorable for the starting of the larvæ.

For the benefit of those who have no experience, we will say the locust has no equal among our quick-growing timbers in durability of wood, either in the air or soil, and no tree in our list will produce a second crop so quickly after the first crop is utilized.

Scald the seeds with boiling water when ready to plant and be sure to plant the swollen seeds in *moist* earth.

OAKS AND HICKORIES.

If we plant acorns or hickory-nuts, we hardly expect to realize anything from them in our time in the way of timber or fruit. The seedlings, as usually managed, are very slow in making an extension of top, but recent

experimentation in this country seems to confirm the teaching of European foresters, that when properly managed in nursery, these trees may be transplanted with safety, and will make a growth about equal to the Hard maple. In the spring, when the plants are two years old, the tap-roots are cut about eight inches below the surface with a sharp spade. This causes them to throw out lateral roots. If transplanted where wanted the succeeding spring, both the oak and hickory will start at once into satisfactory growth. The Bur oak treated in this way in Illinois, and put in grove twelve years ago, is now about the size of the Hard maple planted at same time.

The plan of growing these trees, outlined in the extracts which follow, from an able report to this Society on "Tree Grouping," by Dr. John A. Warder, of North Bend, Ohio, are worthy of careful consideration. This valuable article on *tree grouping*, will be found entire in the Iowa Horticultural Report for 1878.

"You may have felt some surprise that nothing has been said about hickories, and that only the schooled oaks have been named. Here comes in the last suggestion, and one which is urged upon your attention as a very important mode of *grouping* that is presented with considerable confidence. It is based upon an observation of nature's methods, as seen in the rotation of forest species in most woodlands, and also upon some of the favorite methods of European forestry. It may be thus stated:

In planting your cheap trees, see that you have them set out in rows of the several kinds in this manner, beginning with cottonwood: Plant a belt of three rows; next set two or three rows of Water maple or willow, and so on with alternate belts across the block where you want oaks or hickories.

When you have a crop of acorns, plant one in the inter-places, between the cottonwoods of the middle row of each belt. The acorns will soon vegetate and make deep roots. For several years they will make little or no tops, but *there they are*, and there they will stay until your cottonwoods are large enough to be useful, when they should be cut down and utilized. Cut in summer and peel, if used for fencing; cut in winter, if used for fuel. Either leave the brush upon the surface, or remove it and give the ground a good stirring with the plow. The oaks will now start off rapidly, and in a few years the maples, no longer needed to shelter them, should be removed in the intermediate belt, and the oaks, in rows, twenty or twenty-four feet apart, may be allowed ultimately to occupy the ground. If this wide space be considered too great, you may set belts of two rows of maples or willows, alternating with the three rows of cottonwood.

The hickories may be started and managed in the same way. The intervening belt of maples or willows left after the cottonwoods are cut away, will be of great service to the hard wood trees coming on between them, and will force them up straight and less branched. The tenacity of life of some trees, notably oaks and hickories, when smothered in the herbaceous growths of the prairies in summer, and burned by the annual fires in autumn, is perfectly wonderful, and has its illustrations constantly before

you in Iowa. The bluffs along your rivers were bare of trees, or nearly so, on the settlement of the country, and yet behold the result!

Mr. Johnson, of Burlington, finds that the natural timber growth of forty years, commands as much money *to-day* as the combined produce of tillage lands adjoining has produced in all those years. These tree germs were in the soil when the bluffs were bare, or only presented here and there a forlorn, crooked, and low-branched tree, that had escaped the prairie fires.

So all through the State, on the highest ridges of the glacial drift formation, myriads of young oaks and hickories are springing up thickly, now that the fires have been suppressed. No man has sown the seeds for their production. Whence come they, if not from the germs implanted by the provident squirrel and other rodents in the time long past? These germs have shown their vitality and their great power of endurance (perhaps for centuries) for many generations, and their ability, when favoring circumstances occur, to spring up and occupy the land.

No more interesting circumstance connected with the future forestal prospects of your State could be presented to the student of sylvaculture.

If you insist on planting the box-elder at all, let it be the belt or the rows, in which to plant the nuts and acorns, as its premature destruction for fuel will not be regretted.

In building up a grove of Black walnut, a similar plan may be adopted, with this modification: Plant the nuts at the same time as the "cheap trees," and let them occupy the *middle* row of the three rows, before planted with box-elder or cottonwood. In this case it will be necessary to be watchful lest the nurses overpower them, and you may be obliged to hack down the nurses, or most of them, before they have obtained useful sizes. For want of this watchfulness, some walnuts have suffered in mixed plantations in Nebraska; where, however, many more set in a single row on the lines between fields, and exposed on both sides, have been rendered almost useless as timber trees, though large and thrifty, as they grew wide and low-branched. Nature's trimming is the best and cheapest, and it *gets done*. Man's work is expensive, and is often neglected.

In a few instances only the contrary can be shown, where some devotee to his trees has even succeeded in keeping them sufficiently pruned to produce fair logs of walnuts, standing in single row. The natural habit of the tree is to send out lateral branches, and to make a huge, round-headed, spreading top, beautiful in the landscape but unprofitable for the lumberman.

The White oak, Bur oak, and our native oak of the prairie groves, which seems to be a variety of Black oak, are the most valuable, perhaps, for grove culture. Our native Black oak of our timber borders grows very rapidly, when it begins to run up, and will attain size for poles, and even posts, grown very thickly. If dry when placed in the ground, it proves fully as durable as the two first named.

Gather the acorns in fall and keep in sand during the winter, where they

will freeze. Plant early, and cover very lightly with earth with a sprinkling of leaf-mold on top.

OTHER DESIRABLE NATIVE TREES.

Several species of indigenous trees are desirable for ornament variety in mixed plantings, or special uses, a few of which will be very briefly noticed.

HARD MAPLE.

As a rule, it is best to gather small thrifty trees of this desirable lawn and avenue tree from the native timber, where they run up straight. They are not found difficult to transplant. When grown from seed, they are very slow in getting started upward. For fully three years they are low tufts, acting as though they never designed to make trees. They do not transplant easily on our light soils until they begin to shoot up. As a strict grove tree, we have, perhaps, many superior to it in all respects, yet the Sugar maple groves planted twenty-five years ago, are now valuable for sirup and sugar making.

As a tree for the lawn or roadside there is none more symmetrical in growth and though a slow grower when young it makes a rapid growth as it attains age.

The seeds ripen in autumn, and they should be kept in moist sand until the time for sowing. The plants should be kept in seed-bed several years and be well cultivated.

YELLOW AND BLACK BIRCH.

These trees thrive well in groves, or as ornamental trees in slightly sheltered positions. Gather the seed in the fall and mix with sand as advised for other seeds. Our native birch usually is full of catkins.

CHESTNUT.

This desirable tree is not hardy when young, unless it is cared for until it gets some depth of roots. It never does well when transplanted. Keep the chestnut in moist sand and plant early in spring in sheltered position, where they can have good culture in the early part of the season. Cover the whole plant with prairie hay or straw the succeeding fall. When two years old mulch heavily in the fall well up the stems. After this, if the ground is not kept too clean, the trees will usually stand the winters; but if mulched *every* fall until six years old, they will attain more growth and bear fruit much sooner.

HACKBERRY.

This is quite a lofty tree of our river bottoms, and is valued for fuel. Grown from seeds, it sprouts into varieties with much variation in form and foliage. It holds its leaves late in the fall, when they assume shades of

yellow, giving a pleasant variety to the autumn surroundings. It is a rapid grower, and well worth a place in the grove or on the lawn. Gather the fruit (about the size of a pea) in November; mix with sand and sow early in spring.

OSAGE ORANGE.

In groves this tree grows quite rapidly, and is not often severely injured by winter as far north as the 43d parallel. If tried in groves, secure the plants from those grown for hedging. If the time ever comes when we grow the oranges on the hardy variety of the *Maclura*, we can then be sure of the Osage as a hedge plant. There is no more heavy, hard or strong and durable timber grown than this, and after it has attained a few years' age it is a rapid grower.

MULBERRY.

Our native Red mulberry, in timber belts, grows rapidly and retains perfect health on nearly all soils. In isolated positions, especially if exposed to the prairie winds, it soon grows dingy and feeble and dies. The birds usually claim the fruit, so that seed is hard to procure. Strong cuttings, set deeply in the fall, will usually grow. If sprouts are split off from low cut stumps, the lower section is sure to root well.

BUFFALO-BERRY.

This beautiful tree is a native of the Missouri bluffs. It is worth growing for ornament, and will richly repay the trouble of growing by its crop of pleasant acid fruit for culinary use.

Plant in clumps, so as to be certain of securing staminate and pistillate trees. Without this you will have no fruit. It will grow readily from seed kept dry; but soak until it begins to swell, then cover an inch deep in moist dirt.

HARDY CATALPA.

A tree useful and profitable for shade, ornamental lawns and timber.

This tree bears seed very young, often in from four to ten years from planting, so that in a few years after its introduction into any locality, home grown seed can be obtained, and the means for extensive propagation will be abundant.

The seed is produced in a long, round pod, about the size of an ordinary driving whip, and from ten to twenty inches in length; these pods are a third larger and longer than those grown on the tender variety, but the latter produces from five to ten times as many seeds as the other. The seeds are small and flat and are enveloped in a light, feathery husk about an inch in length, and each pod will contain about fifty seeds. A pound of good seed will produce from two to three thousand plants, and the price of the seed is three dollars per pound.

Robert Douglas & Sons, of Waukegan, Illinois, and Woodsworth & Co.,

seedsmen, of Dayton, Ohio, are the only parties that can now be recommended as having the true Hardy seed for sale.

In seeding, prepare the ground as you would for garden planting; if the soil is a little sandy, all the better; if clayey, care should be taken that the soil does not form a crust before the seed comes up. Sow about corn-planting time in drills eighteen inches apart, and hoe and weed often while the plants are small. With good culture, in good soil, the plants will make a growth of one to two feet the first year. They have a large, soft, white root, and they grow readily after transplanting; few young trees can be transplanted with as much success as this.

Cut the tops all off near the ground when the plants are one or two years old (using them for cuttings); the plants so cut off are sure to sprout, and they will send up several thrifty canes, and all should be removed but one, and that one will make a very rank straight growth.

They may be transplanted at one or two years old in places where they are wanted for live fence posts, wind-breaks, shade or timber plantations.

Most farmers, in commencing with this variety, would do better to purchase young trees from one to two years old of nurserymen than attempt to propagate them from seed. The trees are late in starting their buds in spring. Do not plant too closely in groves, as this is a tree that requires a great deal of room; four feet each way is close enough.

Many examples might be given showing the great durability of this timber for posts, and its power to resist decay in exposed situations, but the examples would be where timber of many years' growth, and having but little, if any, sap-wood, was used. In soils as rich as ours, where much sap-wood is produced in young trees, the durability cannot be as great as where the trees are of slower growth and have attained much age and size. To use a hackneyed expression, it seems to be now "the coming tree" for our great Northwest.

WHITE ELM.

No tree makes a better roadside shade than this with its long, pendant, graceful branches, and it furnishes a tough and durable timber for many manufacturing purposes; its tough, elastic branches resist the force of our severe winds with wonderful tenacity, and the tree is a rapid grower. As a shade-tree for the pasture, few are better, and it bears isolation better than the Red elm; its seeds ripen with the Red elm, and the plants are propagated in the same manner.

Are recommended for the uses named in the second column; time when seeds may be gathered is given in third column, and sort of seed in fourth column.

COMMON NAMES.	RECOMMENDED FOR	GATHER IN	KIND OF SEEDS.
Silver leaf maple, Soft maple	Shelter-belt, fuel, ornament	May, June	Broad side-wing.
Sugar maple, Black maple	Sugar, ornament, fuel	Sept., Oct.	Medium side-wing.
Honey maple, Ash-leaf maple, box-elder	Sugar, fuel, shelter, ornament	Oct. to March	Narrow side-wing.
Red maple, Soft maple	Shelter-belt, fuel, ornament	May, June	Small side-wing.
Sugar maple, Rock maple	Sugar, ornament	Sept., Oct.	Medium side-wing.
Balsam fir	Shelter-belt, balsam, ornament	Oct., Nov.	Nutlets in small cone.
Douglas spruce	Shelter-belt, ornament, manufacture	Oct., Nov.	Nutlets in small cone.
White spruce	Shelter-belt, ornament, manufacture	Oct., Nov.	Nutlets in larger cone.
Norway spruce	Shelter-belt, ornament, manufacture	Oct., Nov.	Nutlets in a large cone.
Black spruce	Shelter belt, ornament	Oct., Nov.	Nutlets in a small cone.
Sweet buckeye	Ornament, in south half State.	September	Nuts in fleshy envelope.
Horse chestnut	Ornament, in south half State.	September	Nuts in fleshy envelope.
Tree of Heaven	Manufacture, ornament, in south half State.	Sept., Oct.	Disk-like wing.
Yellow birch	Manufacture, ornament, shelter-belt	Sept., Oct.	Minute winged in catkins.
Sweet birch	Manufacture, ornament, shelter belt, fuel	Sept., Oct.	Minute winged in catkins.
Black birch	Fuel, ornament	Sept., Oct.	Minute winged in catkins.
Paper birch	Shelter-belt, ornament	Sept., Oct.	Berries in racemes.
Barberry (a shrub)	Hedge, ornament	Oct., March	Nut in valved shuck.
Shell-bark hickory	Manufacture, fuel, ornament, fruit	Sept., Oct.	Nut in valved shuck.
Bitter-nut hickory, Swamp hickory	Manufacture, fuel	Sept., Oct.	Nut in valved shuck.
Pignut, or broom hickory	Manufacture, fuel, fruit	Sept., Oct.	Nut in valved shuck.
Pean hickory	Manufacture, fuel, fruit	Sept., Oct.	Nut in valved shuck.
Black hickory	Manufacture, ornament	Sept., Oct.	Two-winged in long pod.
Shell-bark hickory	Manufacture, ornament	Sept., March	Cherries in racemes.
Catalpa	Manufacture, ornament	Aug., Sep.	Berry-like.
Black cherry	Manufacture, fuel, ornament	Sept., Oct.	Nuts in burr.
Hackberry	Manufacture, ornament, fruit	Sept., Oct.	Nutlet in very small cone.
Chestnut	Ornamental manufacture	Sept., Oct.	Small apple.
White cedar	Ornament, hedge	Sept., Oct.	Double winged seed.
Scarlet-fruited hawthorn	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
Cockspear hawthorn	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
White ash	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
Red ash	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
Blue ash	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
Black ash	Manufacture, fuel, ornament	Sept., Oct.	Double winged seed.
Green ash	Hedge, manufacture, fuel, ornament	Sept., Oct.	Hard bean in long pod.
Honey locust		Sept., March	

LIST OF TREES—CONTINUED.

COMMON NAMES.	RECOMMENDED FOR	GATHER IN	KIND OF SEEDS.
Coffeetnut	Manufacture, ornament	Sep., March	Hard bean in large pod.
Butternut, White walnut	Manufacture, fruit	Sep., Oct.	Nut in shuck.
Walnut, Black walnut	Manufacture, fruit	Sep., Oct.	Nut in shuck.
Red cedar	Shelter-belt, ornament	Sep., March	Berry-like cone.
Tyrollese larch, European larch	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlet in small cone.
Tamarack, American larch	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlet in smaller cone.
Osage orange	Hedge, manufacture, in south half State	Sep., Oct.	Seed bedded in large ball.
Mulberry	Manufacture, fruit, ornament	Aug., Sep.	Resembling blackberry.
White pine	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlets in long cone.
Scotch pine	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlets in smaller cone.
Austrian pine	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlets in smaller cone.
Heavy wooded pine	Manufacture, shelter-belt, ornament	Sep., Oct.	Nutlets in smaller cone.
Tooth-leaved aspen, Highland cottonwood	Manufacture, fuel	June	Minute in cotton.
Yellow cottonwood, Necklincs poplar	Manufacture, fuel, shelter-belt	June, July	Minute in cotton.
White cottonwood, Angled cottonwood	Manufacture, fuel, shelter-belt	June, July	Minute in cotton.
Lombardy poplar	Hedge, shelter belt	No seed	
Willow-poplar, Silver-leaved poplar	Shelter-belt	June	Minute in cotton.
Willow-leaved cottonwood	Manufacture, shelter belt	June	Minute in cotton.
Sycamore	Manufacture, wet land	Oct., March	In a ball.
Bur oak, Over-cup oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Post oak, Box white oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Two-colored oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Chestnut oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Quercitron, Yellow oak, Black oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Scarlet oak, Jack oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Red oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Spanish oak, Pin oak, Swamp oak	Manufacture, ornament, fuel	Sep., Oct.	Acorn.
Smooth sumac	Shelter belt, hedge, fuel	Sep., Oct.	Spike of berries.
White willow, Green willow	Shelter belt, hedge, fuel	Sep., Oct.	Minute in cotton.
Basket osier willow	Shelter belt, hedge, fuel	July	Minute in cotton.
Black willow	Shelter belt, hedge, fuel	July	Minute in cotton.
Forbes' willow	Shelter belt, hedge, fuel	July	Minute in cotton.
Aspen	Shelter belt, hedge, fuel	July	Minute in cotton.
Willow	Shelter belt, hedge, fuel	July	Minute in cotton.
Slippery elm, Water elm	Shelter belt, hedge, fuel	Sep., Oct.	Nutlets attached to bract.
Slippery elm, Red elm	Manufacture, fuel, shelter-belt, ornament	May, June	Winged disk.
Wahoo elm, Winged elm	Manufacture, fuel, shelter-belt, ornament	May, June	Winged disk.
Rock elm, Hickory elm	Manufacture, fuel, belts	May, June	Winged disk.

NOTES OF EXPERIENCE AND OBSERVATION ON PRAIRIE
TREE-PLANTING.

BY H. C. RAYMOND, COUNCIL BLUFFS.

It is every man's duty to devote a part of his time for the welfare of his country and the community in which he lives.

It is an undeniable fact that the native forests, containing trees valuable for lumber, are being annihilated at an alarming rate. The fact cannot be fully realized, even when we read the figures, said never to lie.

Again, plant timber for your own profit. This selfish principle, of course, is the first and strongest inducement to plant timber, but yet the fact remains that future generations will reap the greater part of the reward of your labors; for I notice that people do not cut and slash down young and thrifty timber that they have planted with their own hands, as they do that of nature's own planting. I am so filled with the idea of the necessity for timber-planting in the greater portion of our State that I cannot excuse any man who owns forty acres of prairie land from planting a part of it to timber. No man is too poor financially to do it. No man is so rich that he has any moral right to neglect so evident a duty. It is not necessary, I will here note, to wait year after year for the purpose of finding out the best kind of timber to plant. Rather than wait let the settler plant what he can get hold of the easiest and at least cost. While this first planting is growing into value for shelter, fuel, etc., he will have time to study up the relative value of species for future planting. In the end he will very likely find that his early planted cottonwoods and Soft maples have proved, to him at least, as great blessings as catalpa or larch.

While speaking of cottonwood I will say that Prof. Aughey, of Nebraska, seems to have arrived at the conclusion that groves made up of cottonwood trees will usually die out in from four to twenty years, and he thinks it best to plant them *intermingled* with other trees. I have grown them both ways and the *facts are* that this tree will not grow to any considerable size when crowded together; the smaller trees will succumb invariably. When other species are crowded the growth of the weaker trees becomes stationary, but they still for years *cling to life*. The cottonwood considers itself monarch of the forest and is bound to rule or ruin; yet I can say of the cottonwood that I have seen more timber on an acre of ground of it than I ever saw of any other kind, or in any case of mixed timber. This was in Fremont county, Iowa, on the Missouri bottom. The trees were mostly from two to four feet in diameter, and so tall that you had to look twice to see their terminal branches. I did not estimate the average distance of the trees apart, but I think it was more than twenty feet, perhaps thirty. It is very probable that nature planted one hundred trees on the space now occupied by one, but the ninety-nine had ultimately to give away to the *one* that was strongest. So when we plant trees four feet apart we must not expect them all to grow to be four feet in diameter. The greatest number of trees I ever saw attaining size to be valuable on an acre, I saw in northern Michigan in a larch swamp.

The trees, all larch, were of proper size for medium telegraph poles, and stood from six to eight feet apart on an average.

We have, in Iowa, settled down to the theory and practice of very close planting; viz., three and one-half to four feet apart. This is considered a good practice, but we shall all probably err in leaving the trees *all to grow* longer than they should before we commence thinning. Planters will do well to make a note here in their book of remembrance.

I herewith give measurements of several of the species which were planted by me ten years ago. I give the diameters, measured one foot above the surface of the ground. The plants were all about one foot high when planted. These figures are about what may be expected when trees are grown for timber. Isolated trees, or single rows, under favorable circumstances, are, and can be, grown to double the size here given: White maple, diameter 8 inches, height 30 feet; ash, $4\frac{1}{2}$ inches, height 20 feet; Abele or Silver poplar, 9 inches, height 30 feet; Black walnut, 5 inches, height 20 feet; Black cherry, 6 inches, height 28 feet; Catalpa, 6 inches, height 25 feet; White pine, 5 inches, height 10 feet; Scotch pine, 6 inches, height 21 feet; cottonwood, 9 inches, height 35 feet; Ash-Leaved maple, $5\frac{1}{2}$ inches, height 27 feet; butternut, 5 inches, height 20 feet; chestnut (nine-year old, from seed), $4\frac{1}{2}$ inches, height 20 feet; elm, $4\frac{1}{2}$ inches, height 25 feet.

Of the evergreens for timber or wind-break, I would much prefer to grow the Scotch pine. It is most rapid in growth and also the best able to stand all the extremes of our climate (excepting the Austrian pine), and makes valuable timber. The White pine may be equally valuable where the air is more humid, but our air of the Missouri Valley is hard on it when young, yet it can be grown if well sheltered from wind by other trees.

So far the Black cherry has not received the attention that it merits. It grows rapidly, the lumber for finishing work is highly prized, the fruit is valuable for the birds, and the wood is valuable for fuel and very many farm uses. In these degenerate days, when everything we buy is adulterated, we should plant more Sugar maple. The more independent each family may become, the better will it be prepared for famine, pestilence, peace or war. The Silver poplar is a good tree for the lazy man, for it will grow up as fast as he can cut it down, without the trouble of replanting. I have what I have supposed to be the hardiest catalpa, but it has not proved hardy enough to withstand all the vicissitudes of our climate. It is possible that repeated planting of seed may finally acclimate this beautiful and valuable tree. I am not an enthusiast in the culture of any particular species, but recommend planters to use *many kinds*, all of which have value, some, perhaps, for the immediate benefit of the planter, and some for the generations that may come after him.

FORESTS, WOODLANDS, TREES.

BY HON. SUEL FOSTER, MUSCATINE.

The subject of the influence of trees in rain-fall deserves the attention of farmers. Every farm should be divided into suitable lots of five to forty acres making divisions on the highest land for planting timber-belts. The strong, sweeping winds drive the dust from the soil, especially from the hills and ridges, and dry the moisture; and this exhaustion of water from the soil is evidently very great. Forests keep the water from running off, and prevent the sun and wind from drying the ground.

The farmer can thus readily see how he can benefit his farm by planting wind-breaks, while, if his tree-planting induces rain, the moist wind will be likely to pass it on to the adjacent or remote country beyond the reach of his patriotism. Besides the drying effect of the wind, which is more serious here in this level prairie country than it is in the Atlantic States, we find the blowing of the crops about, and sometimes laying them flat, a great damage to the crop.

WHAT TREES TO GROW.

No farm is complete without a wood-lot, and it is easier to raise one than to clear off one covered with the usual natural growth. When one plants his own timber he can have such as he wants. White ash is best for farm tools; Black cherry for cabinet work. It will grow as fast as Black walnut—the walnut roots are poisonous to the crops and orchard trees for some distance. Then, for post timber, the Hardy catalpa has lately been more extensively recommended than any other tree. It is said, by undoubted evidence, that it has been known to last in the ground, as a post, for more than fifty years. This tree is a rapid grower, easily raised from seed and easily transplanted.

The Osage orange, our well known hedge plant, may be grown as a forest tree or wind-break in the south half of the State. It is a remarkably firm, heavy, strong wood, and valuable for many farm uses—for mallets, mauls, beetles, sled-stakes, pins, rake-teeth, single-trees, double-trees, neck-yokes, and many such uses that are constantly arising on the farm.

Set some evergreens about the premises. They make the best wind-break, Set them on the north of the orchard and the buildings. Plant deciduous and fruit trees as early in spring as the ground can be plowed, and evergreens a little later. Some people do not have any luck setting evergreens; it is because they do not know how. Handle them carefully. If the ground is dry use plenty of water. Keep the roots from drying from the time they are taken from the nursery till they are planted out. Plenty of wet straw or rags of gunny-sacks about the roots will keep them moist in going from nursery to the place where they are to be planted. Make a mud-hole and dip the roots in before setting. Dig the hole large enough to lay the roots out in their natural positions; fill in the earth and poke it carefully underneath all the roots. When the roots are all covered and the hole half filled with soil, dash in water enough to

thoroughly settle the dirt about the roots. If it is dry, fill in more dry dirt and tramp it hard that it may be firmly pressed on every part of the roots for the roots must have the privilege of absorbing water, and every part of the bark of the roots will absorb where the moist earth comes in contact with it.

After the trees are set, mulch or cover the surface with any sort of litter, leaving earth on them to prevent blowing away. If drouth comes in summer, water; but do not slop a little water on top of the ground, it is the roots of the tree that need the water; dig the earth away until you get near the roots, then pour in water enough to wet the ground thoroughly a foot distant around and beneath the roots, then fill in the earth and cover with mulch, and it will last a long time, and usually save the life of the tree and contribute greatly to its growth.

A few notes on the relative growth of well known species on my grounds may be useful. They are the results of actual measurement with line and pole, on March 6th, 1879:

Hardy catalpa, 22 years from seed, height 35 to 41 feet, diameter 15 to 16½ inches.

Black cherry, transplanted from woods, 20 years' growth, height 40 feet, diameter 11 inches.

Sugar maple, transplanted from woods, 20 years' growth, height 20 feet, diameter 14½ inches.

Soft maple, transplanted, 20 years' growth, height 35 feet, diameter 16 inches.

Chestnut, from seed, 24 years' growth, height 30 to 39 feet, diameter 10 to 16½ inches.

Hardy catalpa, from seed, 4 years' growth, height 10 to 12 feet, diameter 3 to 5 inches.

White pine, 2 year seedlings, growth 24 years, height 50 feet, diameter 19 inches.

Norway spruce, 4 year seedlings, growth 20 years, height 34 feet, diameter 13 inches.

European larch, 1 year seedlings, growth 10 years, height 20 to 30 feet, diameter 4 to 7½ inches.

Scotch pine, 2 year seedlings, growth 20 years, height 30 feet, diameter 16 inches.

Austrian pine grows much like the Scotch, but more stocky, not quite as tall, is deeper green in color and a more beautiful tree.

The larger catalpas have stood on rather poor, hard soil, and have not had as good culture as the four-year-old trees. As to the two varieties, Hardy and Tender, myself and foreman were looking at them to-day, and we could not attempt to distinguish one from the other by the appearance of the bark and twigs. The hardy one grows thriftiest, and its time of blooming here is from 5th to 15th of June; while the tender kind blooms from two to three weeks later, the flowers of the early variety all dropping before a flower of the other has opened. The hardy variety has a larger and whiter flower, and the seed-pods are much longer and less numerous.

The Sugar maple is a slow growing tree from seed, until it is about five years old, when it begins to make top. In the hard, grass ground by the roadside, it grows, when started, nearly as fast as the Soft maple.

The Black cherry grows nearly as fast as the walnut, and it is more valuable for cabinet work.

I think the White pine the best of the evergreens for timber plantations.

The Norway spruce is a handsome tree for planting near the house.

Do not try too many species, *but be sure to set out trees and set the best.*

BEST MODE OF TRANSPLANTING FOREST TREE SEEDLINGS.

We have almost uniformly advised the planting of forest tree seeds where they are to stand permanently. But this is not always practicable, or indeed advisable. In transplanting, the plan of inserting the plants into a cavity formed by thrusting a narrow spade in the ground and pressing the handle forward, has been generally practiced. But careful growers of forestry belts and hedges find that it pays bountifully to do the work more systematically. In reality, the best and surest method takes little, if any, more time and labor than the less perfect and successful mode of setting behind a spade.

Plow straight furrows four feet apart across the plat, running the plow as deep as possible. When ready to put in the plants, keep the team at hand, and deepen two or three furrows at a time, so the earth will be fresh and moist, by plowing back in each furrow with active boy pressing down on the plow beam. This gives a deep furrow with mellow dirt thrown up on both sides. In setting the plants, two hands work to the best advantage. Stretch a line over the center of the furrow, straighten the crooks in the furrow with a spade, and proceed to set the plants. One hand attends to wetting the roots of the plants, a bunch at a time, as taken from the convenient point where they are heeled in, and sets them upright at proper distance apart, pulling in the requisite loose dirt with his hands or feet. The other hand follows with a hoe, leveling up between the plants, and tramping the earth firmly around each plant.

Two hands in this way will soon put out several acres. After the plat is finished, cultivate with two-horse corn-cultivator or double-shovel, depending on the height of the plants. About the middle of June, plow the spaces between the rows, by throwing the furrows towards the trees. A plantation started in this way will usually make double the growth the first year made by those planted carelessly with a spade, and if the plants are in good order, not one in two hundred will fail to grow. If plants *barely live* the first season after planting, their growth will be feeble for several years, and they are liable to perish the succeeding winter.

TAX EXEMPTIONS

TO ENCOURAGE FORESTRY AND ORCHARD PLANTING IN IOWA.

Section 798 of Title 6, Chapter 1, of the Code, as amended by the Seventeenth General Assembly.

For every acre of forest trees planted and cultivated for timber within the State, the trees thereon not being more than twelve feet apart and kept in a healthy condition, the sum of one hundred dollars shall be exempted from taxation upon the owner's assessment, for ten years after each acre is so planted: *Provided*, that such exemption be applied only to the realty owned by the party claiming the exemption, not to exceed each one hundred and sixty acres of land, upon which the trees are grown and in a growing condition.

For every acre of fruit trees planted and suitably cultivated within the State, the trees thereon not being more than thirty-three feet apart and kept in a healthy condition, the sum of fifty dollars shall be exempted from taxation upon the owner's assessment, for five years after each acre is planted. Such exemption shall be made by the assessor at the time of the annual assessment, upon satisfactory proof that the party claiming the same has complied with this section; and the assessor shall return to the board of equalization the name of each person claiming exemption, the quantity of lands planted to timber or forest trees, and the amount deducted from the valuation of his property.

MIXING FOREST TREES.

BY C. F. CLARKSON, MELROSE, GRUNDY COUNTY, NOW AGRICULTURAL
EDITOR OF STATE REGISTER.

[The following was read before the State Horticultural Society at its annual meeting in 1877, and was published in the Society's volume of transactions for that year.]

There are vital questions to be considered in planting groves. It is probable that the pioneers and advanced men in grove-planting in our State have overlooked one important matter. In trees, grasses, vegetables and grains, nature inclines to variety, and they are all so constituted that, no matter how densely crowded, the different species seldom hybridize, whilst the different varieties of the same species frequently do. It has been found only in extreme cases that different species hybridize, but in no case do the different species of timbers, grains or vegetables. This is a provision in nature evidently for a greater purpose, that of a better growth of mixed forestry.

Lately, some of the best farmers contend that a mixture of the various varieties of wheat produce a larger quantity and a better quality of grain per acre. But all hybrids, whether of the vegetable or animal kingdom, are sterile, nature thereby providing against further admixture or adulteration.

In Europe, where tree-planting is more of a science, and to which our National Horticultural Society proposes sending learned men to take lessons in tree planting, it is one of their rules not to confine a grove to any one species, but the greater the mixture the better the success. One species of tree obtains from the soil all the elements suitable for its growth, while it leaves or rejects that which is suitable for another species. The different writers upon the subject have not settled the exact reason why a heavier growth and longer life were guaranteed to trees when there is a general mixture of the species of forestry, yet experiment and observation have established the fact.

Prof. Aughey, of Nebraska, a scientific man on forestry, strongly urges the vital importance of mixing groves. He says he "has observed many of the exclusively cottonwood groves decay from various causes, when from four to twenty years of age. This, he claims, is only what would naturally be expected by a European forester. If they had been mingled with other trees, such as maples, walnuts, box-elders and lindens, it would probably have preserved them intact, besides making them intrinsically more valuable." The vast forests of beech in Denmark are known by reputation the world over. Years ago they showed signs of rapid decay, and the authorities had other species of trees planted in all the open spaces, such as aspen, willow, oak, birch, maple and fir, and Naupel concedes that this probably saved the forests.

And the forest of Fontainebleau, the Queen's most valuable timber lands, and the one of all her vast domains which shows the most vigor in growth, is a mixture of all the species suitable to that climate. Clave speaks of it in his reports, as follows: "Oaks mingled with beeches in due proportion, may arrive at the age of five hundred to six hundred years in full vigor, and attain dimensions which I have never seen surpassed; when, however, they are wholly unmixed with other trees, they begin to decay and die at the top, at the age of forty or fifty years, like men old before their time, weary of the world and longing to quit it. It was then proposed to introduce the pine and plant it in the vacancies and glades. By this means the forest was saved from the ruin which threatened it, and now more than ten thousand acres of pines, from fifteen to thirty years old, are disseminated at various points, intermixed with broad leaved trees, and sometimes forming groves by themselves."

Professor Agassiz, after having visited all the best artificial groves of this country, as well as the dense sylvas of Central and South America, was convinced that the mixture of such a great variety of species as he found in the south, instead of exhausting the soil, added largely to its wealth of fertility. He found over one hundred species to the acre. And he was of the opinion that when nature's method was violated it tended to dwarf and shorten the age of the trees.

And the Hon. John J. Thomas, a New York horticulturist of note, says in some of his official publications, that "it is the opinion of some planters that a heavier growth may be obtained from a given extent of land by inter-

mingling different kinds, each of which may draw different ingredients from the soil, or extend their roots into the earth at different depths."

"The ash," says C. W. Johnson, "and more particularly the locust, are very obnoxious to most trees. Then again, the grouping together of certain trees is particularly grateful to them all. Thus, the larch is a very good neighbor; the Scotch fir, the birch, and the Spanish chestnut grow very luxuriantly together; the oak, the elm, the hazel, and the hornbeam, are very good neighbors."

In various places in the United States where men of mind and scientific skill have directed in planting groves, for ornament or utility, they have invariably followed the teachings of nature, and intermixed very liberally the various species of parent growth. In laying out the grounds of the Illinois Industrial University, all the science and experience of the age was brought into requisition to start a grove on the college grounds. Twenty acres were set apart for an experimental forest tree plantation, in the grounds of the university, and planted with Green ash, White ash, catalpa, chestnut, White elm, European larch, White maple, Osage orange, Austrian pine, Scotch pine, White walnut, White pine, Norway spruce, and Sugar maple.

The writer has noticed particularly the effect of isolation on the Lombardy poplar (*Populus dilitata*.) It is a tree of rapid growth and is peculiarly adapted to be used as shade trees along public and private highways. But when thus planted it soon begins to fail and die at the top, and soon becomes unsightly. But when it is mixed with other rapidly growing trees, which keep pace with it, its health and greenness are longer perpetuated.

There is a slight disposition among fruit-growers to believe that if pine trees are mixed through an orchard it will have a beneficial influence in driving away the moth of many of the destructive insects which prey upon apples and apple trees. It is supposed to be the strong effluvia issuing from the turpentine of the pine. And others contend that the pine (all its varieties) throws off in the grove, constantly in cold weather, a large amount of warmth or caloric, which has a favorable influence on surrounding trees during our boreal winters. In fact, it is contended by some scientific men that all live trees have this influence, besides the protection which they impart as wind-breaks. And besides these benefits, some medical writers claim that the influence of the turpentine in pine groves is highly beneficial to the health of the human race, as well as to animals which dwell in well ventilated pine groves.

Nearly all the groves in Iowa, unfortunately, have a wearisome sameness. They are either all cottonwood, Soft maple, or willow, with an occasional highly redeeming exception in cases of walnut, oak, ash, etc. It is sincerely to be hoped that more wisdom will be exercised in the future, and that the lessons of the Great Teacher will be heeded in having groves of the greatest possible number of acceptable varieties.

These things are worthy of further demonstration by experiment, especially as it will cost nothing, but will add largely to the beauty and utility of our groves.

IOWA STATE HORTICULTURAL SOCIETY.

LIST OF PREMIUMS OFFERED FOR THE ENCOURAGEMENT OF FOREST TREE PLANTING.

THE following premiums are offered to encourage the planting of trees in permanent timber plantations or belts; the number of trees living to be ascertained by actual count between the 15th of September and the 10th of October, each year. The awards of the premium to depend upon a full compliance with the rules appended to the schedule of premiums.

For the greatest number planted in groves; intrinsic value of species considered.....	\$ 40 00
Second greatest number.....	25 00
Third greatest number.....	10 00
For the greatest number of evergreens and larch in plantations or belts.....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00
For the greatest number of ash trees.....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00
The greatest number of nut-bearing trees, including oaks.....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00
For the greatest number of Black wild cherry, elm, box-elder, birch, or Catalpa Speciosa.....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00
For the greatest number of cottonwood, basswood, willow, maple, and other soft-wooded trees.....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00
For the greatest number of Honey locust (from seed grown on thornless trees is preferable).....	20 00
Second greatest number.....	15 00
Third greatest number.....	10 00

REGULATIONS.

1st. Persons competing for premiums must designate the class for which they compete; as, for greatest number of soft-wooded trees, greatest number evergreens, larch, etc. A plantation may consist of a single variety enumerated, or any number of the kinds mentioned.

2d. Additional plantations must be made for each separate entry for premiums. In other words, a person awarded a premium in one class will not be entitled to premium on same trees in another class.

3d. The plantations competing for these premiums must be made with rooted seedlings or plants, with the exceptions here mentioned: Of willows and soft-wooded trees, growing readily from cuttings, strong cuttings may

be used. In the class of nut-bearing trees, White walnut, Black walnut, and oak may be started from seed where wanted to remain. Plantations of ash, maple, Black cherry, or any other forest tree, may be started from seeds where they are to stand permanently, but they cannot be entered for premium until the close of the second year's growth.

4th. All trees, seeds, and cuttings must be planted in permanent timber plantations or belts, in the spring, except where parties fail to get a sufficient stand they may replant the next year. The plantation must not be made at a greater distance than four feet each way; when counted there must be at least two thousand trees to each acre. The plantations competing for a premium must be on one farm, but need not be contiguous.

5th. The competitor must have his trees counted by two disinterested witnesses between the 15th of September and the 10th of October, counting only those that are alive at that time. After counting, competitor must make affidavit before a justice of the peace or notary public, as to the following facts:

A. Whole number of trees in permanent grove, planted in spring of the current year and now alive; or if it is a replanted grove, planted in the previous year, state the fact.

B. Name and number of each kind planted.

C. How planted.

D. How cultivated.

E. Cost of plantation.

F. Average size of each species of tree.

The parties who counted the trees must append their affidavit as to the correctness of the count. The officer who administers the affidavit shall certify to the identity and credibility of the competitor, and the parties who counted the trees.

6th. The above described affidavit to be forwarded to the Secretary of the State Horticultural Society, Joseph L. Budd, Ames, Story county, Iowa, not later than December 1.

7th. Premiums will be awarded at the annual meeting of the Society, on the third Tuesday in January.

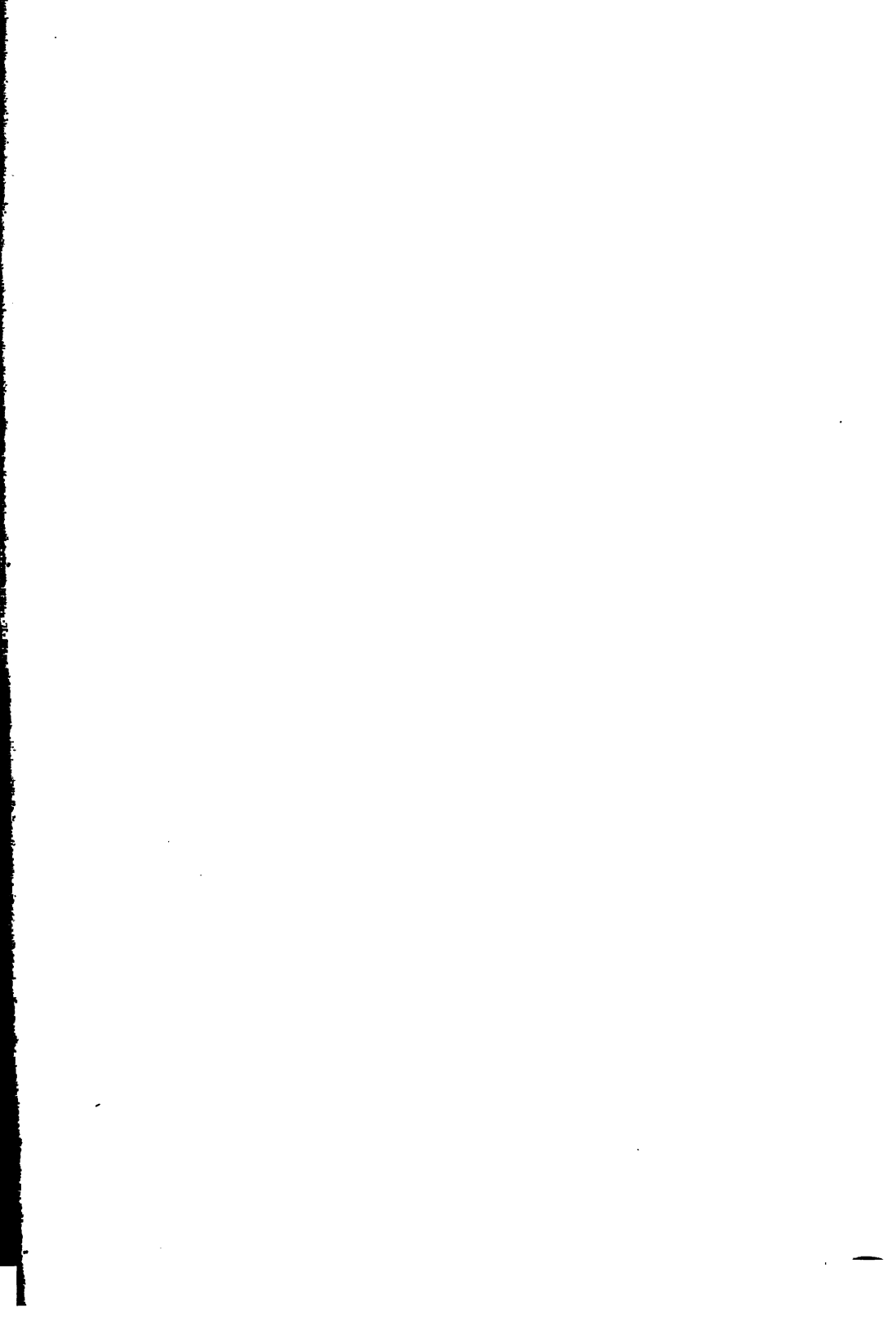
C. L. WATROUS, *President.*

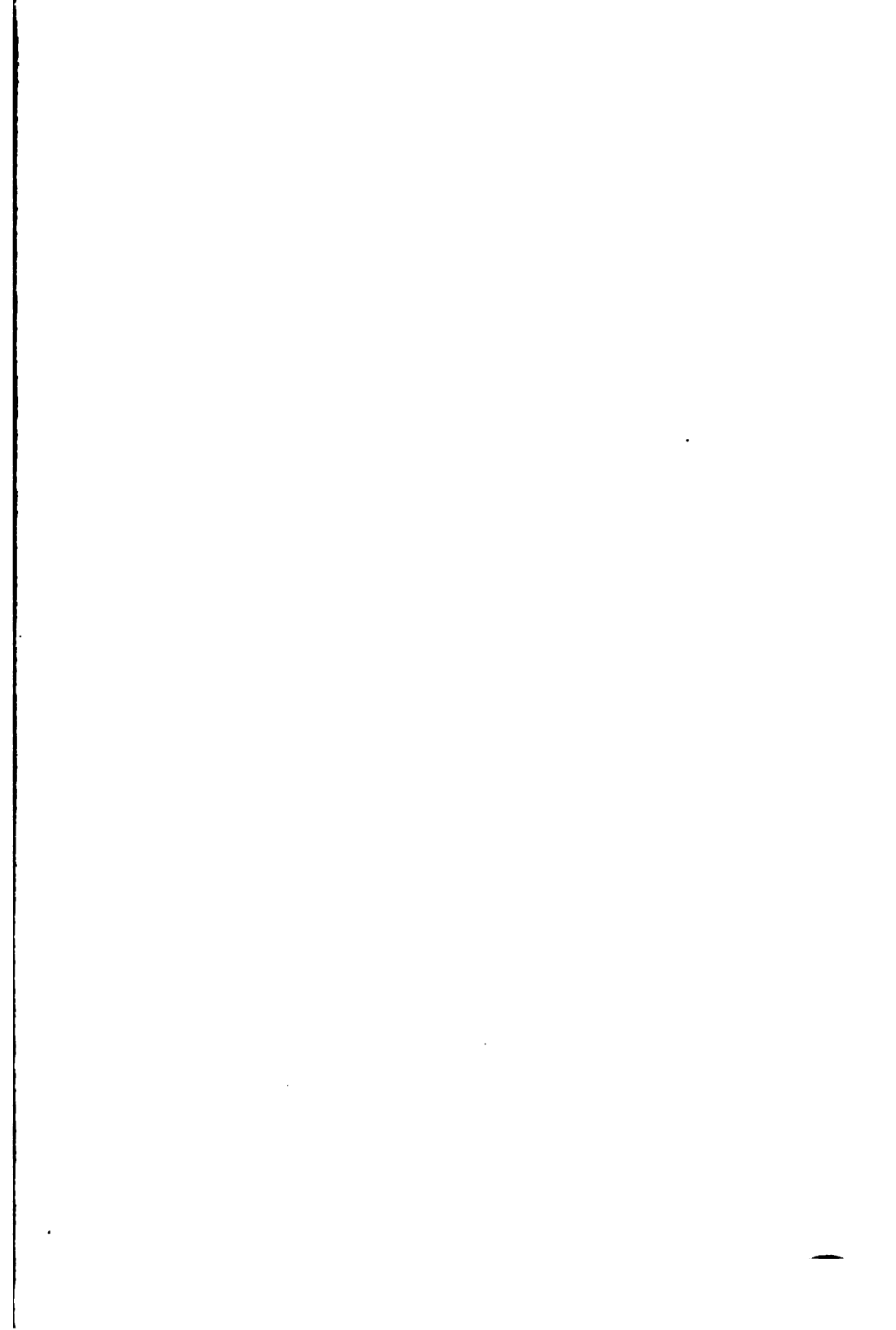
J. L. BUDD, *Secretary.*

IOWA STATE HORTICULTURAL REPORT.

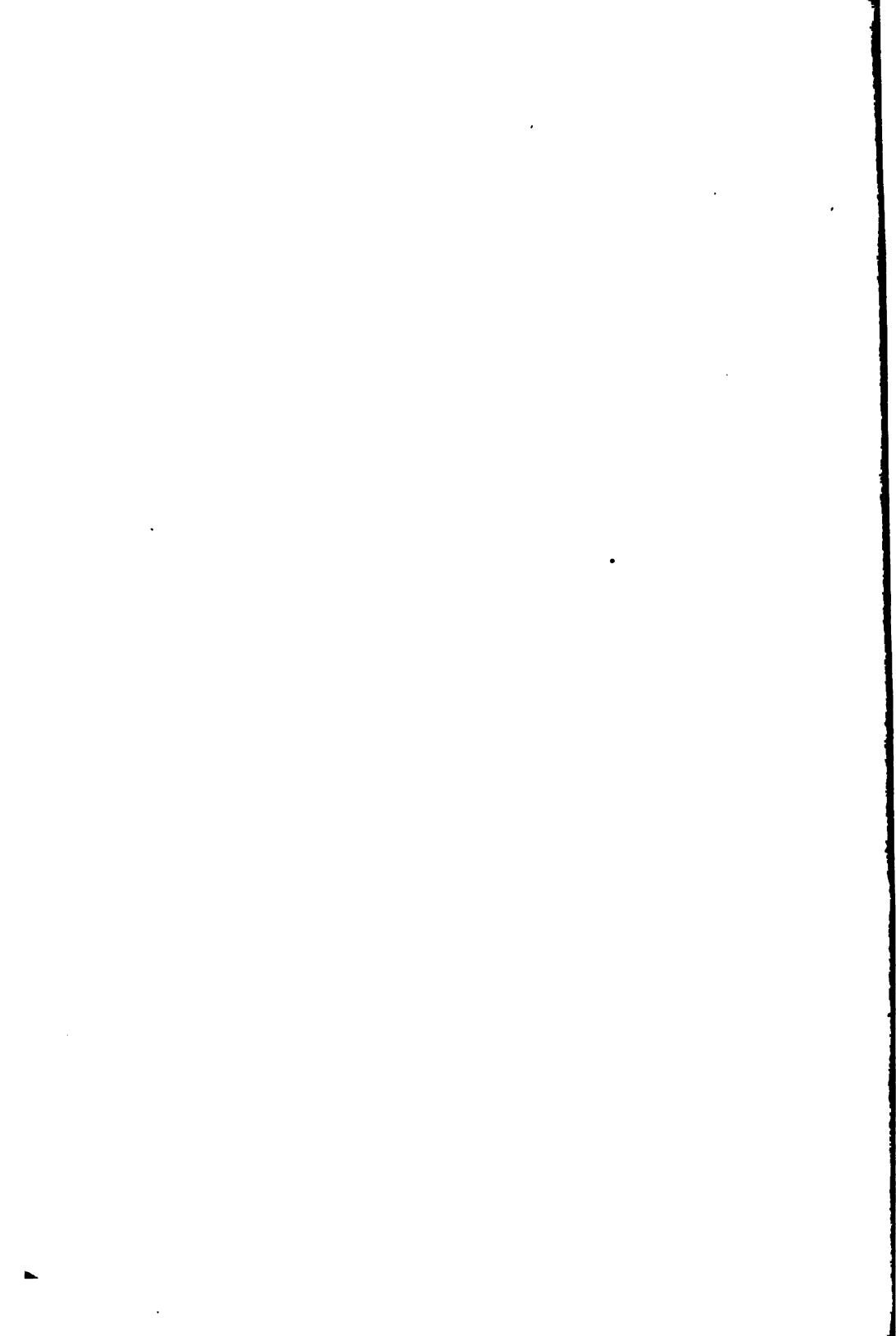
This volume of over four hundred pages, filled with valuable information pertaining to the management, selection and culture of fruit, forest and ornamental trees, shrubs, etc., should be in the hands of all those in the State who wish to make home pleasant by the planting of trees, shrubs and flowers.

The volume is sent, postage paid, to all who become members of the Society by remitting one dollar, as membership fee, to the Treasurer, H. Strohm, Iowa City.













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